

CLAIMS

1. A self-thawing fuel cell stack comprising a plurality of inboard fuel cells sandwiched between a pair of end fuel cells, each of said end fuel cells including a monopolar cell end plate defining a terminus of said stack, an electrically conductive terminal plate abutting each of said cell end plates for delivering electrical current to a load circuit connected to said terminal plates, a low-resistance interface between said abutting plates, a recess in one of said abutting plates at said interface, an electrical-resistance heating element disposed within said recess for heating a said end cell when starting-up a frozen stack, and a heater circuit electrically connecting each said heating element to said stack for conducting electrical current generated by said stack through said heating elements to heat said end cells during said starting-up, said heater circuit including one or more switches that initiate(s) and maintain(s) said conducting until the temperature of said end cells reaches a prescribed, above-freezing, target temperature, and thereafter terminates said conducting.

2. A self-thawing fuel cell stack according to claim 1 wherein said heating element has a first end electrically connected to said one plate in said recess, and a second end electrically connected to said heater circuit.

3. A self-thawing fuel cell stack according to claim 1 wherein said heating elements are selectively positioned adjacent a region of said cell end plates that is most susceptible to ice-clogging during start-up of a frozen stack.

4. A self-thawing fuel cell stack according to claim 1 further including a layer of thermal insulation between said heating element and the ambient for minimizing heat losses from said end cells.

5. A self-thawing fuel cell according to claim 1 wherein said one or more switches include a thermo-mechanical switch engaging said cell end plate.

6. A self-thawing fuel cell according to claim 1 including a controller for triggering the opening of said one or more switches when said target temperature is reached, and a sensor for sensing and reporting said end cell's temperature to said controller.

7. A self-thawing fuel cell according to claim 6 wherein said sensor senses the voltage across the heating element and current in the heater circuit, and reports them to the controller for determination of the electrical resistance of the heating element and the corresponding cell temperature.

8. A self-thawing fuel cell according to claim 1 wherein said heating element comprises a plurality of branches each of which has a first end connected to a buss common to all the branches, and a second, distal end remote from said buss and electrically connected to said one plate in said recess.

9. A self-thawing fuel cell according to claim 1 wherein said recess comprises a plurality of valleys interdigitated with a plurality of ridges, said heating element is disposed within said valley, and said abutting plates form said interface at said ridges.

10. A self-thawing fuel cell according to claim 1 wherein said heater circuit is electrically parallel to said load circuit.